Inter-municipal Inequality in Elderly Nursing Services: The Case of Tokyo , Japan , Immediately Prior to Implementation of the Public Nursing Care Insurance System

Inter-municipal Inequality in Elderly Nursing Services: The Case of Tokyo, Japan, Immediately Prior to Implementation of the Public Nursing Care Insurance System

Hitoshi MIYAZAWA*

Abstract In response to the growing attention to inter-municipal inequalities in nursing services for the elderly immediately prior to the implementation of the Japanese Public Nursing Care Insurance System, this paper examines inter-municipal inequalities in the supply of elderly nursing services in Tokyo Metropolis based on an analysis of the latest related data. Two statistics measuring inequalities indicate that the supply of services relative to need is not equal between municipalities. Local indicators of spatial association also detect some significant spatial patterns concerning these inequalities. For home nursing services, home help service is primarily supplied in the central area of Tokyo, day care service primarily supplied in the suburbs, and short stay service primarily supplied in the mountainous areas, respectively. This spatial pattern seems to be influenced both by differences in elderly population density and the uneven distribution of nursing institutions for the elderly. In addition to this general pattern, there are serious inequalities in service supply between some municipalities and their neighbors.

Key words: nursing services for the elderly, inter-municipal inequality, Nursing Care Insurance System, local indicator of spatial association, Tokyo Metropolis

1 Introduction

The Japanese population is aging very fast compared with other countries. The National Institute of Population and Social Security Research (1997) estimated that the percentage of the elderly (aged 65 years or higher) will rise from 14.6% of the entire population in 1995, to 25.2% in 2015. This institute also estimated that the elderly population of Japan will reach 33 million in 2025, the highest number ever. Increased longevity, a falling birth rate, and aging of the baby-boom generation are the causes on the rapid aging of the Japanese population (Sagaza, 1993).

While there are individual differences, there is a growing possibility that persons

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may experience a loss of health over a long period as they grow old, particularly past the age of 85, due to the decrease in the body's recuperative power from disease and injury. When the elderly become unable to manage daily life by themselves, they require nursing care. An increase in the number of the elderly means an increase in that part of the population that has a high likelihood of needing nursing. Nursing care for the elderly, therefore, has thus become an actively discussed topic as a social problem confronting Japan.

Historically in Japan, nursing of the elderly has been shouldered by their family, especially women. Although the nursing capabilities of families are decreasing due to the shrinking size of households and the social advancement of women, many women keep on shouldering nursing of the elderly at home. Various problems concerning family nursing have become apparent, making the rapid socialization of nursing of the elderly necessary.

In Japan, the postwar social security system consisted primarily of a pension and medical insurance systems, while the level of social welfare, including nursing of the

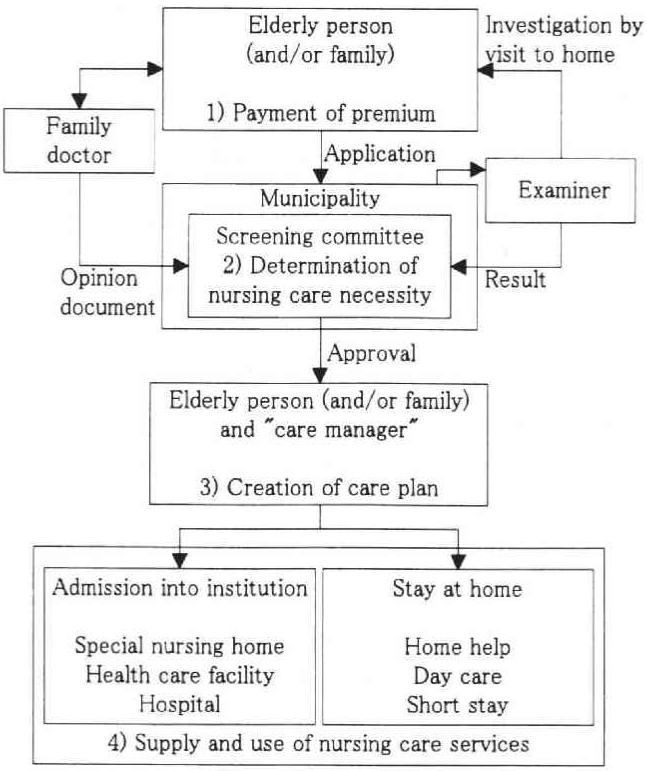


Fig. 1 Public Nursing Care Insurance System in Japan

elderly, remained poor. Social welfare spending represents only 10% of total social security spending in Japan, making Japan a less-developed country in terms of social welfare (Hiroi, 1999). To secure human resources and improve institutions for nursing services, Japan launched the Ten-Year Strategy to Promote Health Care and Welfare for the Elderly (the Golden Plan) in 1989, and revised it in 1994 (the New Golden Plan). Following this plan, Japan will introduce the Public Nursing Care Insurance System (PNCIS) to sustain the social nursing care system from April 2000.

2 Public Nursing Care Insurance System in Japan

The concepts and problems of PNCIS are summarized below (Figure 1).

1) Payment of premium in social insurance system

There is currently considerable reluctance in personally receiving welfare services, because such services are paid for by taxes in Japan. Cases of death from starvation due to the refusal of livelihood protection are an example of this. However, since a social insurance system similar to the existing pension and medical care systems will be introduced into social welfare under PNCIS, it should become easier for people to feel they have the right as premium payers to use such services. When PNCIS is implemented, nursing care premiums will be collected from persons aged 40 or over, and 90% of the cost of nursing care received by the elderly who are recognized as needing such care will be paid by the nursing care insurance. Although the premium paid by persons between the ages of 40 and 64 will be constant throughout the country, the premiums paid by persons aged 65 and over will differ according to the contents of services and the number of elderly persons in each municipality.

There are a number of problems linked to the social insurance system, including a rise in future premiums and a potential increase in the number of self-employed persons who fail to meet premium payments. If municipalities incur a deficit with regard to nursing care insurance, it will be difficult for them to supply substantial nursing services. Particularly in municipalities with a weak financial base due to depopulation, it will be necessary to raise the premium paid by every elderly person.

2) Municipal determination of need for nursing care for the elderly

The elderly, in order to receive nursing services, must submit an application for such services to the municipality. Upon receipt of an application, an examiner of the municipality is sent to the home of the elderly applicant to check his or her living conditions, and the result of this investigation is reported by computer to the municipality's nursing care screening committee. The opinion of the elderly person's family doctor is also submitted to this screening committee. Based on this data, the screening committee judges the degree of nursing care necessity of the elderly applicant. Only after the necessity for nursing care has been established by the screening commit-

tee does the applicant become eligible for nursing care insurance. Since such screening committees will basically be established in each municipality, efforts should be made so that judgment criteria do not differ excessively among municipalities.

3) Choice of services by the elderly or family members

When elderly persons become eligible for nursing care insurance, they or their family members prepare a nursing care plan with the advice of a specialist called a "care manager". In this step, it is determined whether the elderly person will enter a nursing care institution or can receive nursing care at home. If it is determined that the person shall enter a nursing care home, the nursing care institution is selected, and if it is determined that the person shall receive care at home, the contents of the nursing care are decided.

4) Supply and use of nursing care services

The elderly eligible for nursing care insurance pay 10% of all nursing care expenses. Nursing services in Japan, which are primarily provided by the municipality or welfare corporation, are divided into institutional nursing services such as special nursing homes for the elderly, and home nursing services such as home help, day care, and short stay. The former category of services is designed for elderly persons for whom it would be difficult to stay at home. Such elderly persons are made to enter nursing homes, where they can receive various nursing services. In contrast, the latter category of services is designed to provide nursing care to the elderly in their home or residential region insofar as possible. Home help consists in a helper going to the elderly person's home and helping with tasks such as bathing and housekeeping. Day care consists in the elderly person daily visiting an institution attached to a nursing home and so forth for the elderly, and receiving various services there. Short stay consists in an elderly person entering for a short term an institution to receive various services there.

Since municipalities are responsible for welfare service administration in Japan, differences in the supply of such services are expected among municipalities. Japanese welfare service administration was shifted from the national government to municipalities in 1990. This will remain unchanged under PNCIS. It is predicted that depopulated municipalities in particular will have difficulty supplying adequate services owing to limited revenues and human resources. The elderly will be faced with a dearth of service options in such municipalities due to the inferior nursing care service level.

As mentioned above, PNCIS is based on the respect for the right of the elderly to select and use nursing care services. The materialization of these concepts, however, largely depends on the degree to which service supply meets actual needs, and this degree differs for each municipality. The issue of inter-municipal inequalities in service provision has been frequently pointed out from early on in discussions about

PNCIS. However, a survey performed by the National Association of Mayors in October 1998 indicated that 60% of all cities would be unable to offer the required level of nursing services in the year 2000 (Tokyo Shimbun, 14 January 1999). At about the same time, the National Association of Towns and Villages submitted a petition to the national government requesting the increase in the national government's subsidy for nursing service supply, the approval of cash grants for family nursing at home, and the deferment of PNCIS implementation until sufficient service supply capabilities are attained (Yomiuri Shimbun, 26 November 1998). Just prior to the implementation of PNCIS, there are increasing worries about the implementation of PNCIS, and inter-municipal inequalities regarding the supply of nursing services are again questioned.

3 Inter-municipal inequalities in elderly nursing services in Tokyo Metropolis

3.1. Method and data

In response to the growing attention to inter-municipal inequalities in nursing services for the elderly, this section clarifies where and to what extent inequalities exist through the measurement of two statistics indicating the level of inequality, and by mapping and analyzing their spatial pattern. This paper examines the case of nursing service supply in Tokyo Metropolis including 54 municipalities, immediately prior to the implementation of PNCIS. The reason is that about 1.5 million elderly persons live in Tokyo Metropolis, which represents over 8% of the total elderly population in Japan, making Tokyo the prefecture with the largest elderly population. Furthermore, regional variations in the supply and use of nursing service can easily be studied since Tokyo Metropolis is located in the western sector of the Tokyo metropolitan area and has a relatively simple regional structure consisting of a central area, residential areas in the suburbs, and a mountainous area in the periphery.

The latest data for nursing service supply in Tokyo—capacity of special nursing homes, total number of times home help service are used for a year, total number of days day care service and short stay service are used for a year—was obtained from the Tokyo Metropolitan Government Bureau of Social Welfare (1998) and the Foundation of Social Development for Senior Citizens (1998). Data regarding the level of need for nursing care services was estimated by multiplying the total elderly population based on the Basic Resident Registers for 1996 and 1997 by the rate of elderly persons in need of nursing care based on statistics of the Tokyo Metropolitan Government Bureau of Social Welfare (1996).

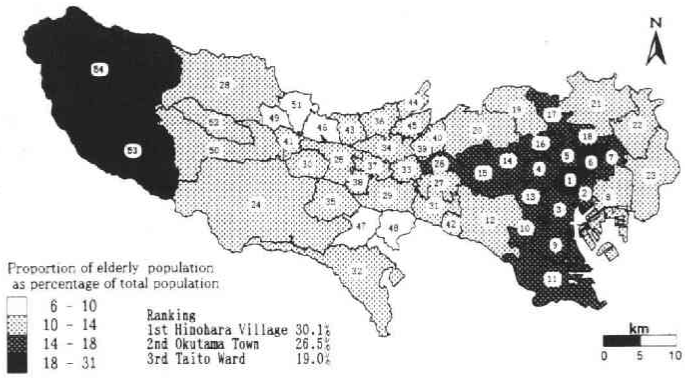
Below, inter-municipal inequalities are first measured using a correlation coefficient between indices of supply of and need for services, and the gini coefficient. These statistics, however, cannot be used to detect inequalities at the local scale. To overcome this limitation, local Moran's I, one of the local indicators for spatial

association, is applied to detect significant local patterns related to the degree of sufficiency of service supply in relation to need. One of the purposes of applying local indicators of spatial association is to detect significant patterns of local spatial association (Anselin, 1995). Local Moran's I is expressed as

$$I_i=\frac{(x_i-\bar{x})}{\sum_i(x_i-\bar{x})^2}\sum_j w_{ij}(x_j-\bar{x}),$$

where I_i is the Local Moran's statistic for region i, x_i, x_j are the variables for region i and j, w_{ij} is the binary weight given to the relationship between region i and j: $w_{ij}=1$ if region i neighbors on region j, and it is zero otherwise. If statistic I_i is a positive value, this indicates local spatial clustering of similar (high or low) values of variable x around region i. Inversely, if statistic I_i is a negative value, it indicates the existence of spatial outliers: there is a great difference between values of variable x in region i and its neighbors, that is, high values are surrounded by low neighboring values and vice versa.

There are two procedures for testing the significance of this statistic: 1) the distribution of this statistic is approximated by normal distribution and 2) it is estimated from the conditional randomization approach with Monte Carlo simulation. Anselin (1995) elucidates, however, that normal distribution may not be an appropriate approximation. The author of this paper also obtained a similar result, then adopted



1. Chiyoda 2. Chuo 3. Minato 4. Shinjuku 5. Bunkyo 6. Taito 7. Sumida 8. Koto 9. Shinagawa 10. Meguro 11. Ota 12. Setagaya 13. Shibuya 14. Nakano 15. Suginami 16. Toshima 17. Kita 18. Arakawa 19. Itabashi 20. Nerima 21. Adachi 22. Katsushika 23. Edogawa 24. Hachioji 25. Tachikawa 26. Musashino 27. Mitaka 28. Ome 29. Fuchu 30. Akishima 31. Chofu 32. Machida 33. Koganei 34. Kodaira 35. Hino 36. Higashimurayama 37. Kokubunji 38. Kunitachi 39. Tanashi 40. Hoya 41. Fussa 42. Komae 43. Higashiyamato 44. Kiyose 45. Higashikurume 46. Musashimurayama 47. Tama 48. Inagi 49. Hamura 50. Akiruno 51. Mizuho 52. Hinode 53. Hinohara 54. Okutama

Fig. 2 A proportion of elderly population as percentage of total population in Tokyo Metropolis (1996)
Source: Basic Resident Registers.

Table 1 Relationships between need for and supply of elderly nursing services

Supply of nursing services	Correlation coefficient	Gini coefficient
Special nursing home (capacity)	0.48**	0.51
Home help (annual usage times)	−0.03	0.23
Day care (annual usage days)	−0.36**	0.26
Short stay (annual usage days)	−0.08	0.28

Note: **Significant at 0.01 level.

the conditional randomization procedure with Monte Carlo simulation of 10,000 times. According to Ord and Getis (1995), Bonferroni bounds are also employed as the significance level.

3.2. Geography of inequality in nursing services

The proportion of the elderly population as a percentage of the total population in Tokyo is 13.3% according to the Basic Resident Registers for 1996. By municipal district (Figure 2), this proportion is high in municipalities in both the western mountainous area and the central area of Tokyo. These areas are characterized by a fall in the working age and young population and a large number of elderly who need nursing care. In addition, the elderly population exceeds 14% in the area neighboring the southwestern side in the central area, which became a residential area at a comparatively early time. In contrast, the municipalities with the lowest proportion of elderly persons are located in newly developed residential areas in the suburbs.

The relationships between need and supply for nursing services for the elderly are shown in Table 1. According to the concept of territorial justice (Davies, 1968; Pinch, 1985; Boyne and Powell, 1991; Sugiura, 1997), the closer to 1.0 the correlation coefficient between need and supply, the higher the justice level. With regard to special nursing homes in Tokyo, nursing services are supplied proportionally to the need for such services, although somewhat loosely ($r=0.48$, $p<0.01$). However, a stronger correlation ($r=0.75$, $p<0.01$) is obtained when only municipalities in suburban and mountainous areas are examined, and there is no correlation between need and supply in the municipalities in the central area. Day care services are supplied in inverse proportion to needs, so-called negative territorial justice ($r=-0.36$, $p<0.01$). The supply of home help and short stay services does not correlate to the respective needs for these services. Gini coefficients indicate that there is considerable inter-municipal inequality regarding the supply of special nursing home capacity, and that the supply of home nursing services is not characterized by equality either.

To detect inequality at the local scale, the supply of services per elderly person in need of nursing care in each municipality is illustrated in Figure 3, and measurements

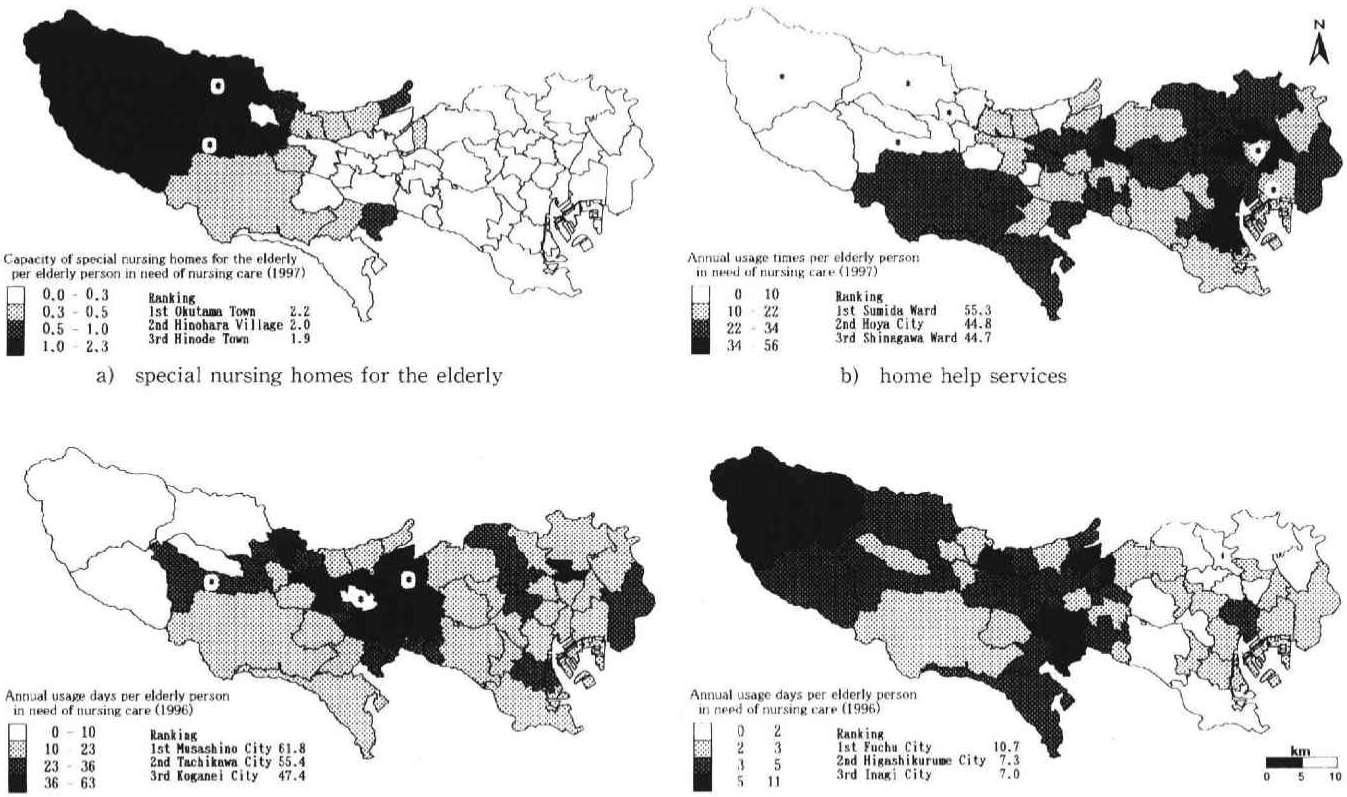


Fig. 3 Maps of supply of nursing care in Tokyo Metropolis

Note : * Significance of local Moran's I (see Table 2) under a conditional randomization procedure, with the individual significant level, the Bonferroni bound, of 0.0009 (=0.05/54).

Table 2 Measurement of local spatial association, local Moran's I and its significance

	Municipality	Nursing home		Home help		Day care		Short stay	
		I_i	P_r	I_i	P_r	I_i	P_r	I_i	P_r
1	Chiyoda	0.2296	0.0611	0.0473	0.0238	−0.0023	0.2896	−0.0851	0.1963
2	Chuo	0.1931	0.0838	0.5035	0.0386	0.1121	0.0873	−0.3253	0.1515
3	Minato	0.1973	0.0327	1.0624	0.0752	0.1981	0.2920	0.0760	0.2157
4	Shinjuku	0.2971	0.0386	0.6504	0.0574	−0.0523	0.2736	0.3632	0.0453
5	Bunkyo	0.2868	0.0101	0.7177	0.1482	−0.0307	0.3244	0.5789	0.0256
6	Taito	0.2517	0.0567	−0.8952	0.0004*	0.0038	0.4990	0.1910	0.3400
7	Sumida	0.2527	0.2553	0.8613	0.3606	0.1383	0.5094	0.3033	0.1932
8	Koto	0.2078	0.0884	−0.1054	0.0004*	0.3033	0.2155	0.0837	0.4172
9	Shinagawa	0.2440	0.0591	0.6701	0.2158	−0.0906	0.0298	0.3466	0.0213
10	Meguro	0.2917	0.0234	0.1717	0.2501	0.2074	0.2391	0.5719	0.0073
11	Ota	0.3032	0.0910	−0.3936	0.0757	0.1456	0.4080	0.5830	0.0676
12	Setagaya	0.3013	0.0053	0.0085	0.3872	0.0045	0.2246	0.5543	0.0170
13	Shibuya	0.2920	0.3357	−0.0992	0.1801	0.1726	0.1656	0.7639	0.0329
14	Nakano	0.2678	0.2983	0.0350	0.3248	0.0406	0.1002	0.3110	0.4570
15	Suginami	0.3038	0.0032	0.0099	0.4374	−0.1859	0.1773	0.6093	0.0525
16	Toshima	0.2603	0.0310	0.1544	0.0587	−0.0733	0.3740	0.6055	0.0157
17	Kita	0.2785	0.0895	0.2885	0.0197	−0.1987	0.2649	0.8684	0.0009*
18	Arakawa	0.2793	0.0202	1.4322	0.0172	−0.6129	0.1017	0.4179	0.0019
19	Itabashi	0.1450	0.0238	0.1146	0.3841	−0.0886	0.3902	0.6940	0.0524
20	Nerima	0.2308	0.1319	−0.0833	0.0362	−0.2244	0.0429	0.0725	0.1743
21	Adachi	0.2608	0.0234	0.4855	0.0123	0.1551	0.3344	0.6955	0.0092
22	Katsushika	0.2664	0.1396	−0.0448	0.0239	0.2291	0.2005	0.6367	0.1698
23	Edogawa	0.2521	0.1376	0.2756	0.0659	−0.0729	0.0716	0.0983	0.0285
24	Hachioji	0.1025	0.0393	−0.1311	0.0653	0.2748	0.1374	−0.1482	0.2530
25	Tachikawa	0.0161	0.3834	0.1666	0.0775	−0.5829	0.2534	0.1586	0.2153
26	Musashino	0.2771	0.0784	0.1695	0.3442	1.4215	0.1294	0.0012	0.5404
27	Mitaka	0.2955	0.0050	−0.0904	0.3645	0.2901	0.0199	0.2308	0.1235
28	Ome	3.9043	0.0009*	2.2157	0.0001*	0.2718	0.3336	0.0546	0.3245
29	Fuchu	0.0879	0.2709	0.0326	0.3250	0.3721	0.2771	1.2661	0.1962
30	Akishima	−0.0019	0.3687	0.2111	0.3549	−0.3336	0.2147	−0.0565	0.3748
31	Chofu	0.1642	0.2582	−0.1844	0.1446	0.3230	0.0220	0.1462	0.0527
32	Machida	−0.0397	0.2406	0.0905	0.4302	0.1870	0.2876	−0.0752	0.4629
33	Koganei	0.2511	0.0357	−0.2182	0.2541	1.4873	0.0181	−0.3367	0.0342
34	Kodaira	0.0689	0.3048	−0.1085	0.1319	0.5843	0.0749	0.0785	0.1337
35	Hino	0.0617	0.4813	−0.1877	0.1226	−0.0984	0.1198	−0.2938	0.0314
36	Higashimurayama	0.0082	0.3705	0.1792	0.3871	−0.1822	0.1735	−0.5387	0.0697
37	Kokubunji	0.2000	0.2483	−0.0645	0.1175	−2.2530	0.0008*	−0.0455	0.0252
38	Kunitachi	0.2221	0.2270	0.0037	0.5104	0.1121	0.0929	0.4238	0.0250
39	Tanashi	0.1705	0.2684	0.2016	0.1686	0.5169	0.0003*	0.6036	0.0831
40	Hoya	0.0215	0.1068	0.5964	0.2555	1.2358	0.0187	0.9264	0.0861
41	Fussa	0.3096	0.1360	0.8934	0.0076	−0.0640	0.0793	−0.1131	0.2226
42	Komae	0.2585	0.1034	−0.1444	0.3638	0.0054	0.3309	0.0785	0.3531
43	Higashiyamato	−0.0002	0.3926	0.2652	0.1976	−0.3275	0.0541	0.1139	0.1676
44	Kiyose	0.0120	0.3086	0.0016	0.1371	−0.1187	0.2227	0.3510	0.1272
45	Higashikurume	−0.0054	0.3948	−0.0766	0.2362	0.5152	0.2032	0.9813	0.1550
46	Musashimurayama	0.0617	0.2024	0.3942	0.0286	0.0571	0.0497	0.0435	0.4149
47	Tama	−0.0268	0.5222	−0.0167	0.2374	−0.0263	0.2831	0.3193	0.0151
48	Inagi	−0.0967	0.5247	0.0069	0.4257	0.5369	0.1128	3.2942	0.0181
49	Hamura	−0.2356	0.0142	1.6867	0.0002*	0.0447	0.3081	0.0018	0.5577
50	Akiruno	3.0917	0.0001*	1.6668	0.0004*	−0.9021	0.0002*	0.0552	0.3122
51	Mizuho	0.8656	0.0984	1.6020	0.0089	−0.4206	0.2896	−0.1179	0.2097
52	Hinode	5.9591	0.0142	2.6187	0.0052	0.3707	0.4220	−0.2075	0.2456
53	Hinohara	6.0531	0.0101	1.1768	0.0673	0.9788	0.1664	0.4273	0.1970
54	Okutama	8.5839	0.0014	1.8739	0.0009*	1.3201	0.0839	0.8982	0.1473

Note: *Significant at the individual significant level, Bonferroni bound, of 0.0009 (=0.05/54).

of the local spatial association, local Moran's I, and its significance derived from conditional randomization procedure, are reported in Table 2. There is a significant spatial pattern concerning the supply of special nursing home capacity (Figure 3-a, 1st and 2nd columns of Table 2). The I_i statistics indicate the existence of local spatial clustering of municipalities with a large service supply capacity around Ome City and Akiruno City in the mountainous area of Tokyo.

A large number of special nursing homes for the elderly have been established in urbanization control areas or peripheral mountainous areas, because of the difficulty to secure enough site and obtain the approval of local resident for building such institutions in urban areas (Inoue, 1998). In contrast, there is relatively low capacity in municipalities in the center area, where needs are the highest. This serious inequality (see also Table 1) is causing a phenomenon of so-called "care migration," whereby the elderly population migrates from urban residential areas to isolated institutions located in peripheral areas. For example, about 90% of special nursing home users in Ome City are migrants from other municipalities.

Next, let us examine home nursing services. In the case of home help, there is a significant spatial pattern concerning the number of times this service is used per year by each elderly person in need of nursing care (Figure 3-b, 3rd and 4th columns of Table 2). Significant negative values of statistics I_i proving the existence of spatial outliers are shown for Taito Ward and Koto Ward. These spatial outliers reveal that serious inequalities exist between municipalities with a relatively low service capacity and their neighbors with a high service capacity. Significant positive values of statistics I_i proving the existence of spatial clustering are shown for some municipalities with a low service capacity in the mountainous area.

In terms of the number of days per year day care is used (Figure 3-c, 5th and 6th columns of Table 2), significant values of the statistics I_i are shown for Tanashi City and Kokubunji City, a positive value for the former and a negative one for the latter. These values reveal that municipalities that supply a large amount of day care are concentrated in the northeast part of suburbs, which is characterized by a low number of elderly persons in need of nursing care, whereas serious inequality exists between Kokubunji City and its neighbors. In the mountainous area, a significant negative value of statistics I_i is shown for Akiruno City, which supplies a relatively large amount of services, which indicates that municipalities with a relatively low service supply are located around this municipality. These results demonstrate the negative territorial justice of this service (see Table 1).

An examination of the annual usage days of short stay shows that significant spatial clustering of municipalities supplying a small amount of short stay services around Kita Ward (Figure 3-d, 7th and 8th columns of Table 2). Although not statistically significant, municipalities supplying a large amount of service are scattered in the

Table 3 Correlation coefficients between supply of home nursing services and indices concerning population density of the elderly and nursing institutions for the elderly

Supply of home nursing service per elderly person in need of nursing care	Population density of the elderly in need of nursing care	Supply of special nursing homes (capacity)
Home help (annual usage times)	0.56**	−0.54**
Day care (annual usage days)	0.08	−0.34*
Short stay (annual usage days)	−0.50**	0.27*

Note: *Significant at 0.05 level. **: Significant at 0.01 level.

western part of Tokyo.

General spatial patterns in the supply of home nursing services in Tokyo are summarized as follows: 1) a large amount of home help services is primarily supplied in municipalities in the central area, which has a high need for nursing care services, 2) a relatively large amount of day care services is supplied in suburbs with low need, 3) in municipalities in the western mountainous area, which have a high need for nursing care services, home help and day care services are almost not supplied, but short stay services are primarily supplied by institutions attached to special nursing homes for the elderly.

This spatial pattern is influenced by differences in the elderly population density and the uneven distribution of nursing institutions for the elderly (Table 3). It is difficult to efficiently supply home nursing services, especially home help and day care services, to the elderly on a daily basis in mountainous areas because home helpers' access to elderly person's home is made difficult by the existence of narrow slopes that cars are hard to negotiate and the fact that elderly persons live scattered over a wide area. For instance, it is considered that a home helper can assist only two elderly persons a day in this area. There is a relatively large number of institutions supplying short stay services for the elderly instead, where the elderly receive various nursing care services for about one week. These services are appropriate in this area.

In contrast, there are few such institutions in the central area of Tokyo, and they are difficult to establish in this area, despite the fact that it has a very high concentration of elderly persons in need of nursing care. It is, therefore, more efficient and realistic to primarily supply home help services in this area. In the suburbs, there are relatively many large-scale hospitals for the elderly compared with the central area, and day care and short stay services are supplied at these institutions.

4 Conclusion

This paper has examined inter-municipal inequalities in the supply of elderly

nursing services in Tokyo Metropolis immediately prior to the implementation of PNCIS, based on an analysis of the latest related data. Two statistics measuring inequalities indicated that the supply of services relative to need is not equal between municipalities. Local indicators of spatial association, Local Moran's I, also detected some significant spatial patterns concerning these inequalities. For home nursing services, home help service is primarily supplied in the central area of Tokyo, day care service is primarily supplied in the suburbs, and short stay service is primarily supplied in the mountainous areas, respectively. This spatial pattern seems to be influenced both by the differences in elderly population density and the uneven distribution of nursing institutions for the elderly. In addition to this general pattern, there are some spatial outliers, that is, serious inequalities in service supply between given municipalities and their neighbors.

Under PNCIS, a nursing care plan model for elderly persons classified as being in most serious need of nursing care consists of home help use 640 times, day care use 120 times, and short stay service 12 weeks a year (Watanabe, 1997). Of course, not all elderly persons belong to the above category, and there are various nursing care plans according to the needs of each elderly person, but is there even a single municipality where it is possible to receive this amount of services? (see Figure 3)

The creation of nursing care systems that are appropriate for their region requires that not only the municipality's planners, but also the residents who will receive the nursing services in question, have a say in nursing care policy under PNCIS. Enlightened decisions on such policy should be made based on exact recognition of existing conditions, for example through the use of comparative analysis. However, concrete information concerning nursing services, especially data on inter-municipal inequalities such as that presented in this paper, has not been made sufficiently available to the public until now. Fortunately, detailed data on nursing services will be easily obtained from each municipality's special audit system for PNCIS after its implementation. The analytical procedure described in this paper may be of value for the analysis of data to be used in discussions for the formation of appropriate regional nursing care systems.

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(*in Japanese, **in Japanese with English abstract)

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